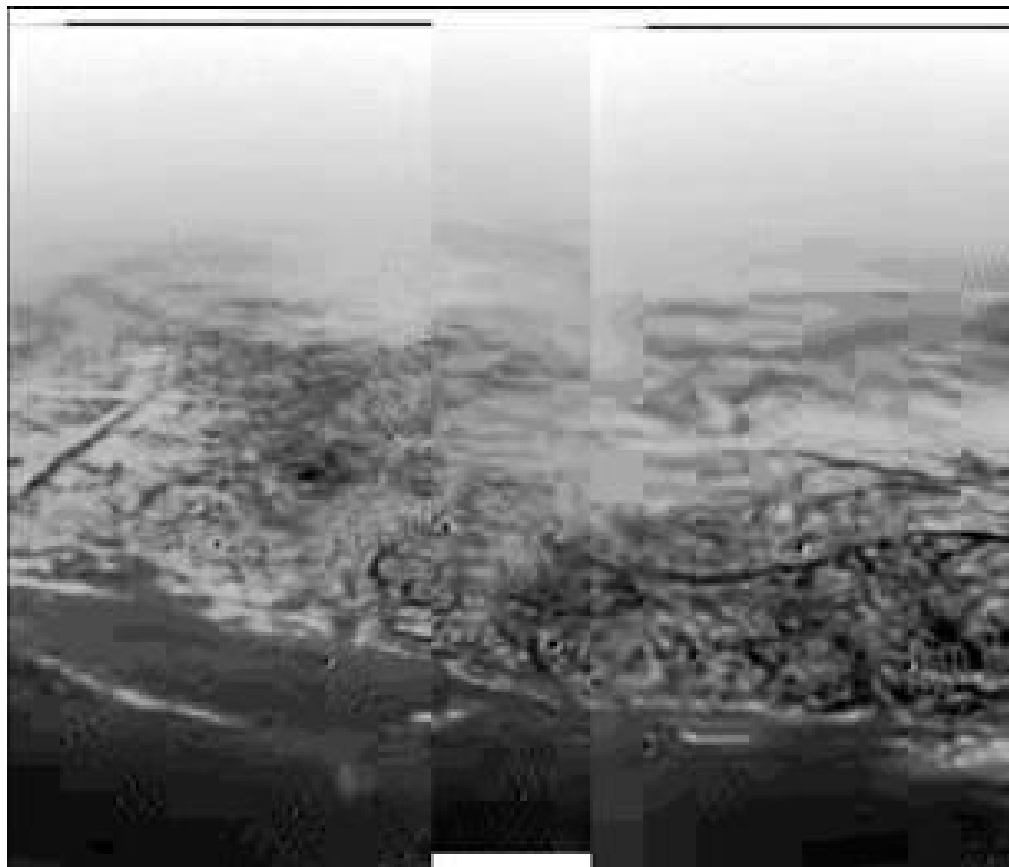


C A S S I N I



T I T A N 0 4 8 T I (T 3 4) MISSION DESCRIPTION

July 2007

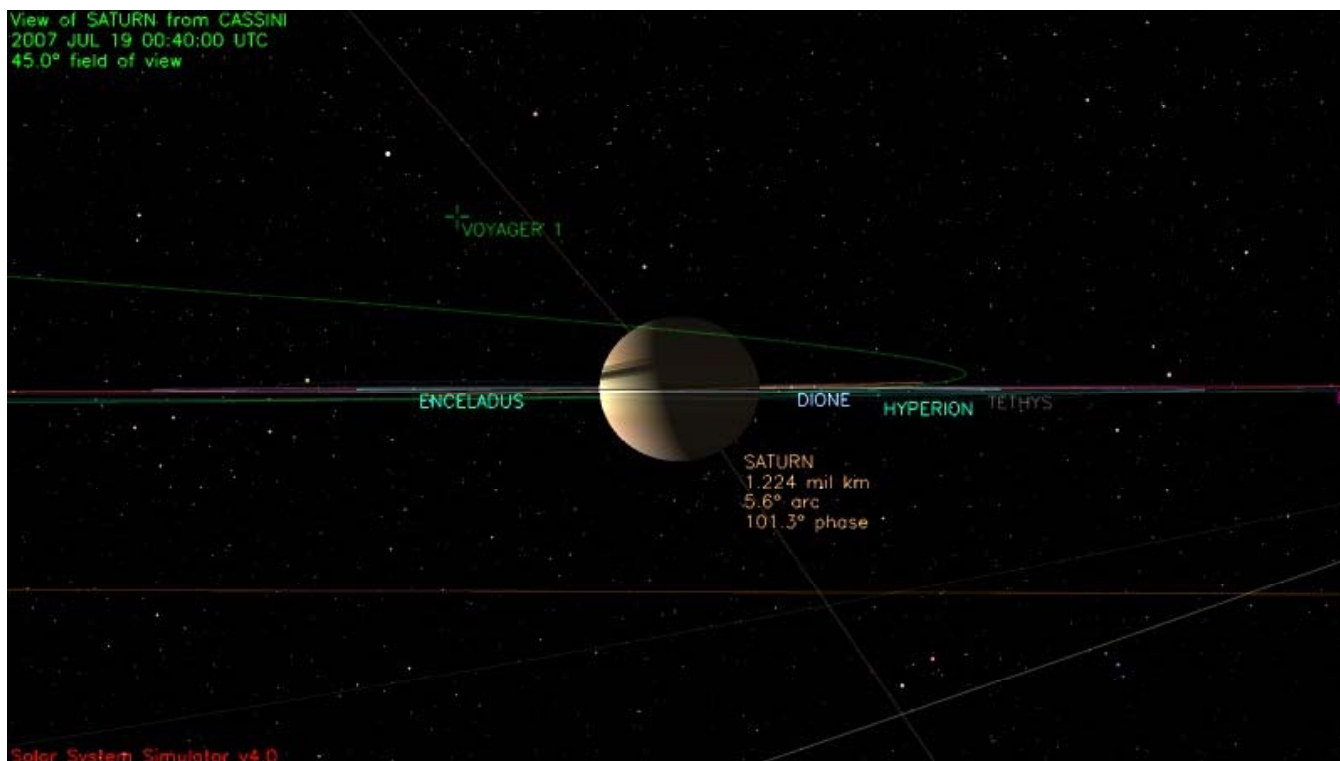
Jet Propulsion Laboratory
California Institute of Technology

Cover image: Building Our New View of Titan (June 1, 2007). This composite was produced from images returned on 14 January 2005, by ESA's Huygens probe during its successful descent to land on Titan. It shows the boundary between the lighter-coloured uplifted terrain, marked with what appear to be drainage channels, and darker lower areas. These images were taken from an altitude of about 8 kilometres with a resolution of about 20 metres per pixel. Credits: ESA/NASA/JPL/University of Arizona

1.0 OVERVIEW

Twenty days after Cassini's Titan-33 flyby, the spacecraft comes back to Titan for its thirty-fifth targeted encounter. The closest approach to Titan occurs on Wednesday, July 19, at 2007-200T01:11:20 spacecraft time at an altitude of 1332 kilometers (~828 miles) above the surface and at a speed of 6.2 kilometers per second (13,870 mph). The latitude at closest approach is 1.3 degrees N and the encounter occurs on orbit number 48.

This encounter is set up with two maneuvers: an apoapsis maneuver on July 8, and a Titan approach maneuver, scheduled for July 15. This is the first inbound Titan encounter since T24, and occurs just under two days before Saturn closest approach.



1.1 ABOUT TITAN

If Titan were a planet, it would likely stand out as the most important planet in the solar system for humans to explore. Titan, the size of a terrestrial planet, has a dense atmosphere of nitrogen and methane and a surface covered with organic material. It is Titan that is arguably Earth's sister world and the Cassini-Huygens mission considers Titan among its highest priorities.

Although it is far colder and lacks liquid water, the chemical composition of Titan's atmosphere resembles that of early Earth. This, along with the organic chemistry that takes place in Titan's atmosphere, prompts scientists to believe that Titan could provide a laboratory for seeking insight into the origins of life on Earth. Data from the Huygens probe, which touched down on Titan's surface in January 2005, and the Cassini orbiter has shown that many of the processes that occur on Earth also apparently take place on Titan – wind, rain, volcanism, tectonic activity, as well as river channels, and drainage patterns all seem to contribute in shaping Titan's surface. However, at an inhospitable -290 degrees Fahrenheit (-179 degrees Celsius), the chemistry that drives these processes is fundamentally different from Earth's. For example it is methane that performs many of the same functions on Titan that water does on Earth.

The Huygens probe landed near a bright region now called Adiri, and photographed light hills with dark river beds that empty into a dark plain. It was believed that this dark plain could be a lake or at least a muddy material, but it is now known that Huygens landed in the dark region, and it is solid. Scientists believe it only rains occasionally on Titan, but the rains are extremely fierce when they come.

Only a small number of impact craters have been discovered. This suggests that Titan's surface is constantly being resurfaced by a fluid mixture of water and possibly ammonia, believed to be expelled from volcanoes and hot springs. Some surface features, such as lobate flows, appear to be volcanic structures. Volcanism is now believed to be a significant source of methane in Titan's atmosphere. However, there are no oceans of hydrocarbons as previously hypothesized. Dunes cover large areas of the surface.

The existence of oceans or lakes of liquid methane on Saturn's moon Titan was predicted more than 20 years ago. Radar and imaging data from Titan flybys have provided convincing evidence for large bodies of liquid. With Titan's colder temperatures and hydrocarbon-rich atmosphere, these lakes and seas most likely contain a combination of liquid methane and ethane (both hydrocarbons), not water.

The Cassini-Huygens mission, using wavelengths ranging from ultraviolet to radio, is methodically and consistently revealing Titan and answering long-held questions regarding

Titan's interior, surface, atmosphere, and the complex interaction with Saturn's magnetosphere. While many pieces of the puzzle are yet to be found, with each Titan flyby comes a new data set that furthers our understanding of this world as we attempt to constrain scenarios for the formation and evolution of Titan and its atmosphere.

1.2 TITAN-34 SCIENCE HIGHLIGHTS

- **VIMS:** VIMS will carry out high resolution mapping for geology and composition at Titan closest approach. On approach, the instrument will examine mid-latitude cloud formation and evolution. Previous observations monitored mid-latitude clouds in the southern hemisphere, which were originally discovered via ground-based observations. Some scientists theorize that these clouds are the natural consequence of the circulation and condensation of atmospheric material, while others believe they are plumes from active geologic events. If the former model is true, mid-latitude clouds should form in the north as Titan transitions from a southern summer to a northern summer. VIMS will also seek possible hotspots from volcanoes or other features. The data from these sequences is valuable for cloud evolution; photometry; movies; and search for hotspots, lightning, and aurorae (none of which have been found yet). These flybys cover mostly large solar phase angles, but these observations are valuable for deriving the phase function of the surface and the haze, and for viewing clouds.
- **RSS:** T34 is the last RSS Titan bistatic observation in the Cassini nominal mission. The observation is conducted on the inbound approach to Titan, roughly from -77 to -12 minutes relative to closest approach (C/A) time. During that period, the Cassini HGA boresight is continuously maneuvered to point to the region on Titan's surface where mirror-like (specular) reflection, if detectable, can be observed at the NASA DSN ground receiving stations at Goldstone and Canberra. The T34 experiment enjoys the unique advantage of an observation geometry near the Brewster angle of likely surface compositions throughout the 65 minutes observation period. This special geometry allows unambiguous determination of the surface dielectric constant, and hence its physical state and properties, from simultaneous measurement of the RCP and LCP (right and left circularly polarized, respectively) echo components, if detectable. The surface region probed extends from about -12 to -7 degrees South latitude and about 217 to 225 degrees West longitude (~25 degrees west of the Huygens landing site). Potential detectability of a weak echo strongly depends on potential presence of relatively flat (liquid or solid) Titan terrain within the HGA footprint over the surface region probed (the ground track). The T34 observation geometry also enjoys the advantage of extending in time till near C/A where a smaller distance to the surface enhances the measurement signal-to-noise ratio, hence enhances potential detectability of any weak surface echo.
- **MAG:** T34 is one of the most important flybys for MAG. This is the only Titan encounter in the nominal mission that occurs when the direction of incoming uv photons from the Sun and the plasma flow resulting from the rotation of Saturn's magnetosphere are parallel. As a result,

Titan's interaction during T34 is expected to be similar to the solar wind interaction with Venus, Mars or comets, which are characterized by the formation of a 'magnetic barrier' (made from piled-up magnetic field lines from Saturn) above a well developed dayside ionosphere. During the flyby, Cassini will explore this magnetic barrier as well as Titan's ionosphere, which is most strongly developed because of the maximum ionization sources.

Is there any chance of encountering Titan in the solar wind in T34, or other Titan flybys? Although unlikely for T34, Cassini found Titan at the edge of Saturn's magnetosphere during T32, implying that the satellite - when it is located near the subsolar region - can be immersed in the shocked solar wind during periods of high solar wind pressure.

- **CIRS:** CIRS measurements will seek to determine Titan's atmospheric deuterium to hydrogen ratio. Voyager IRIS measured only one isotope—the D/H in methane—but at a much lower value than the giant planet value. The Huygens probe also measured D/H, which was roughly ten times greater than the giant planet value. CIRS (and INMS) observations will help explain this puzzle.
- **ISS:** T34 is the only Titan flyby covering a subset of the terrain for the sub-Saturnian hemisphere. T34 also gives us the closest view of region between Belet and Senkyo. This isn't the best view, since this part of the surface is at a fairly high emission angle off to the right of the disk - the best viewing geometry occurs during a non-targeted encounter in Rev 51 - but this observation and the non-targeted encounter are the only views of this territory in the nominal mission. More observations will be needed to fill in coverage of this part of Titan in the extended mission.
- **UVIS:** The team will obtain spectral images of Titan in the EUV and FUV to map the aurora and dayglow, to map hydrocarbon absorption, and to measure scattering and absorption by aerosols in the stratosphere.

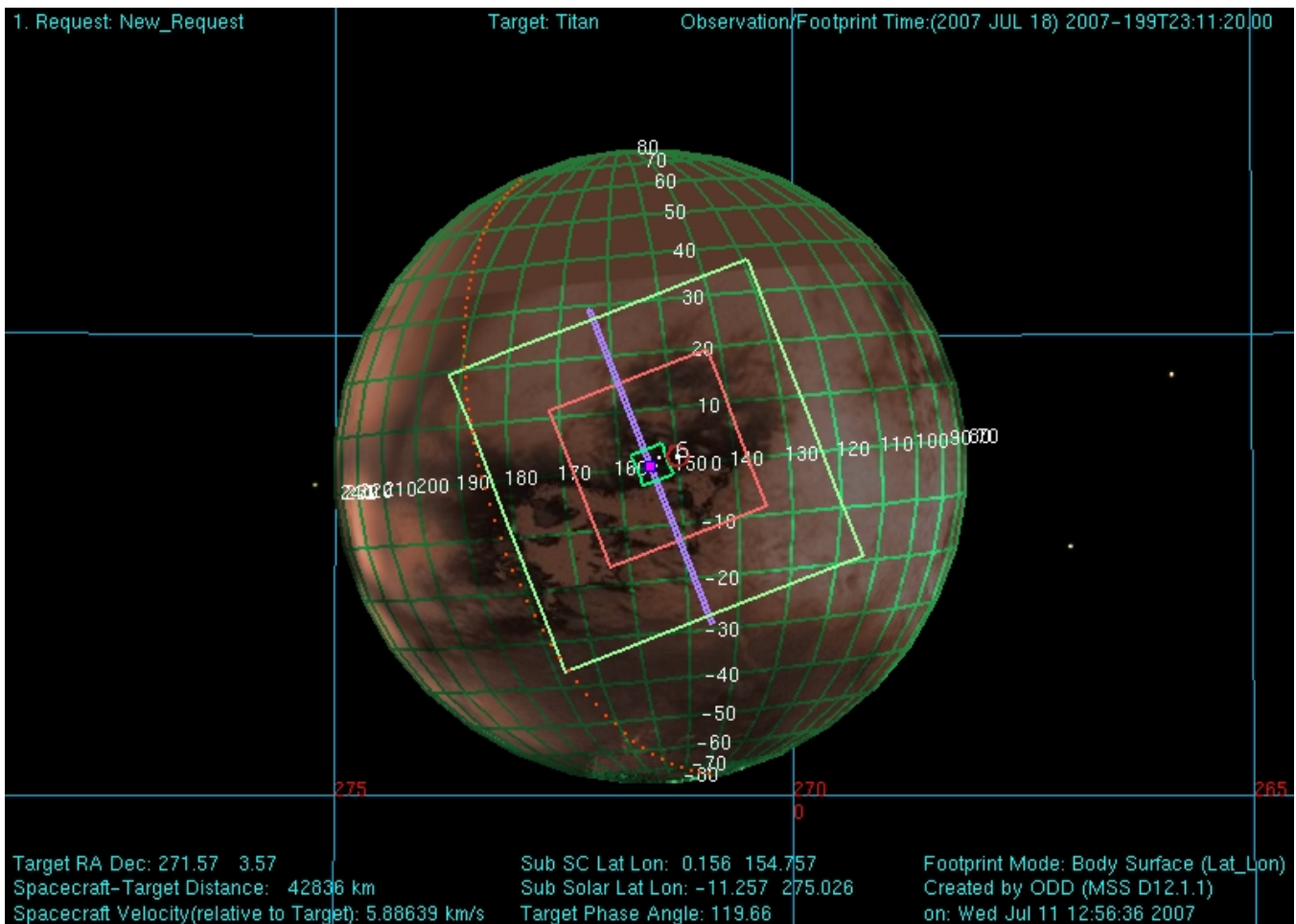
1.3 SAMPLE SNAPSHOTS

Three views of Titan from Cassini before, during, and after closest approach to Titan are shown below. The views are oriented such that the direction towards the top of the page is aligned with the Titan North Pole. The optical remote sensing instruments' fields of view are shown assuming they are pointed towards the center of Titan. The sizes of these fields of view vary as a function of the distance between Cassini and Titan. A key for use in identifying the remote sensing instruments fields of view in the figures is listed at the top of the next page.

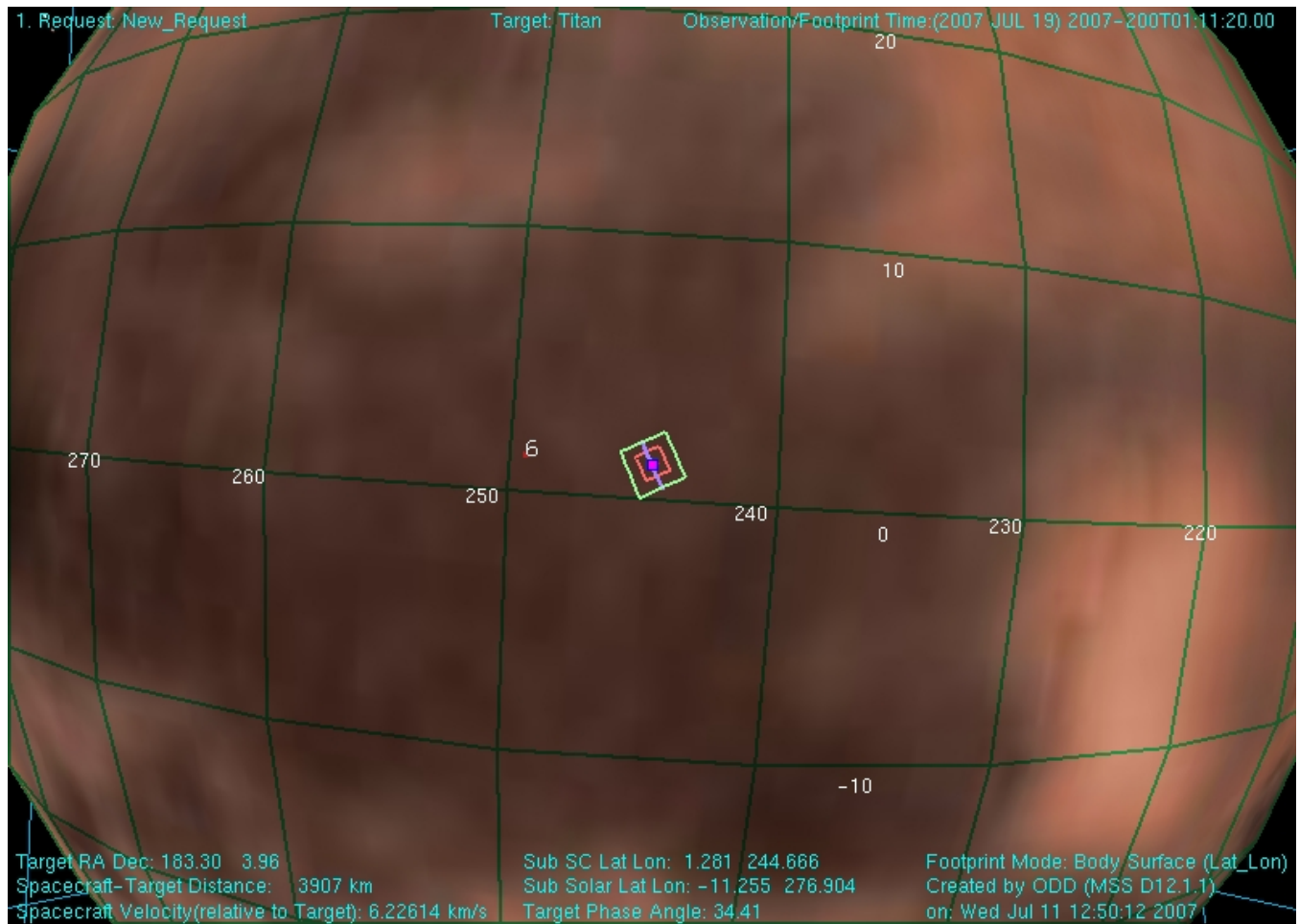
Key to ORS Instrument Fields of View in Figures

Instrument Field of View	Depiction in Figure
ISS WAC (imaging wide angle camera)	Largest square
VIMS (visual and infrared mapping spectrometer)	Next largest pink square
ISS NAC (imaging narrow angle camera)	Smallest green square
CIRS (composite infrared spectrometer) – Focal Plane 1	Small red circle near ISS_NAC FOV
UVIS (ultraviolet imaging spectrometer)	Vertical purple rectangle centered within largest square

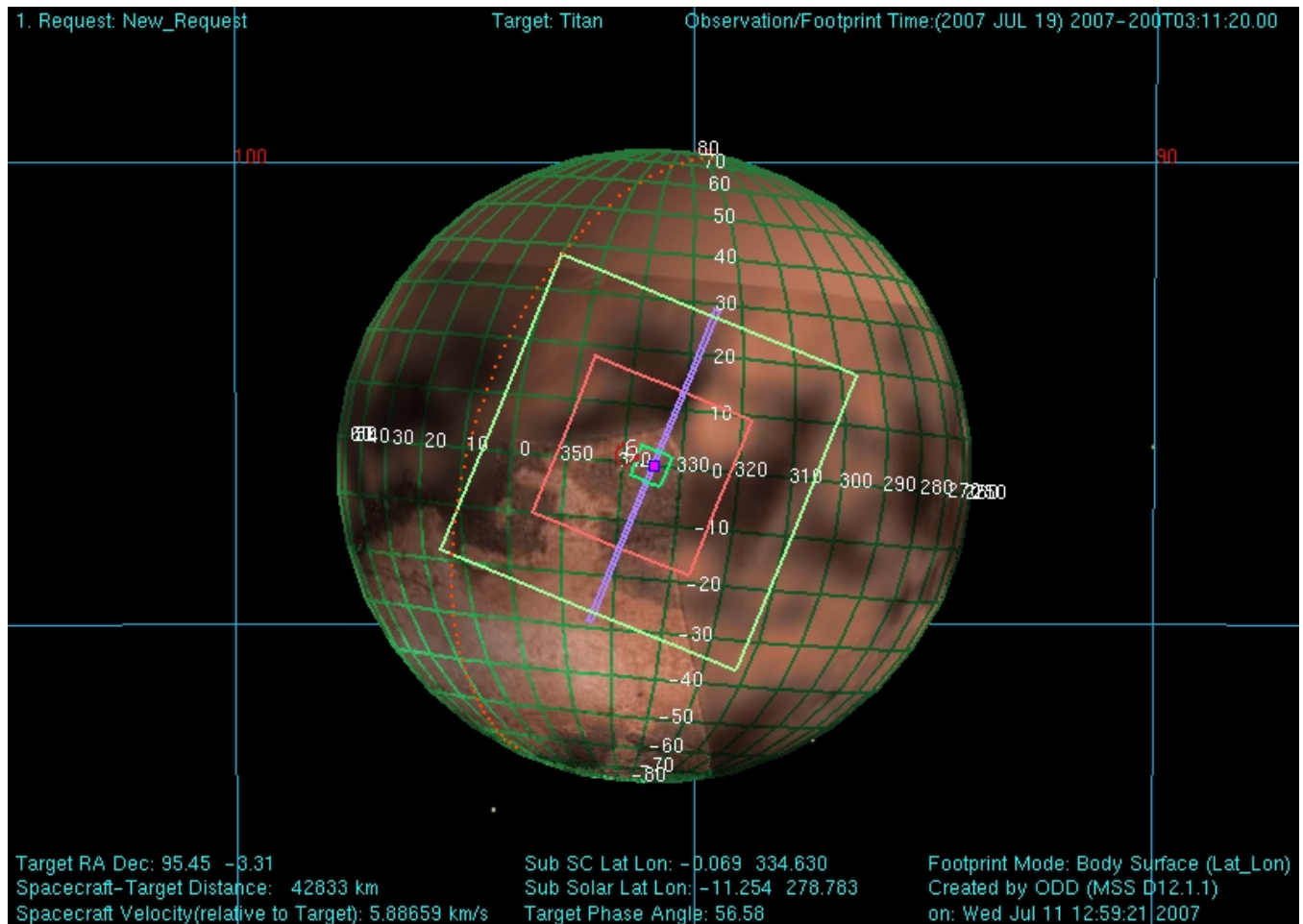
View of Titan from Cassini two hours before Titan-34 closest approach



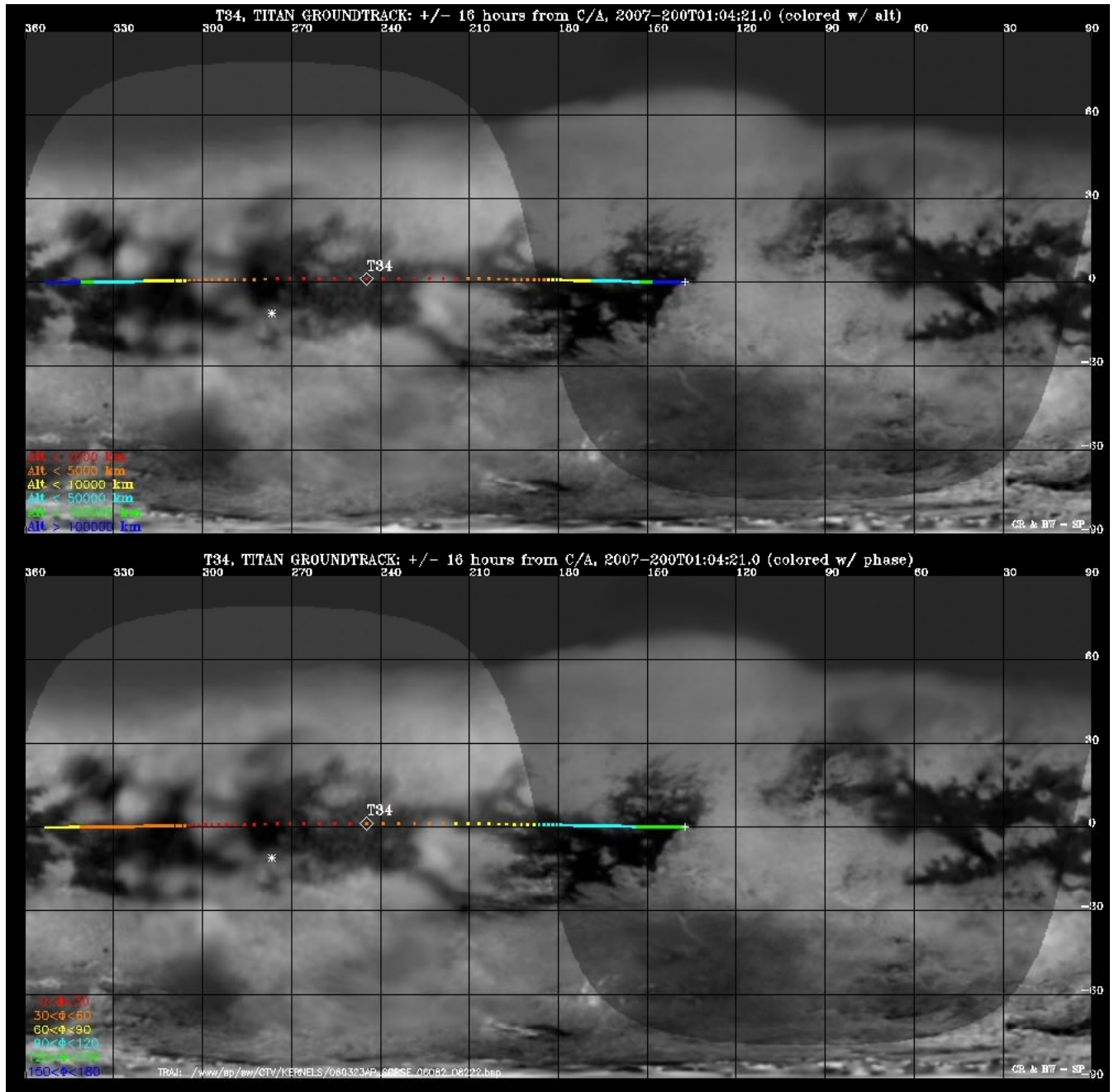
View of Titan from Cassini at Titan-34 closest approach



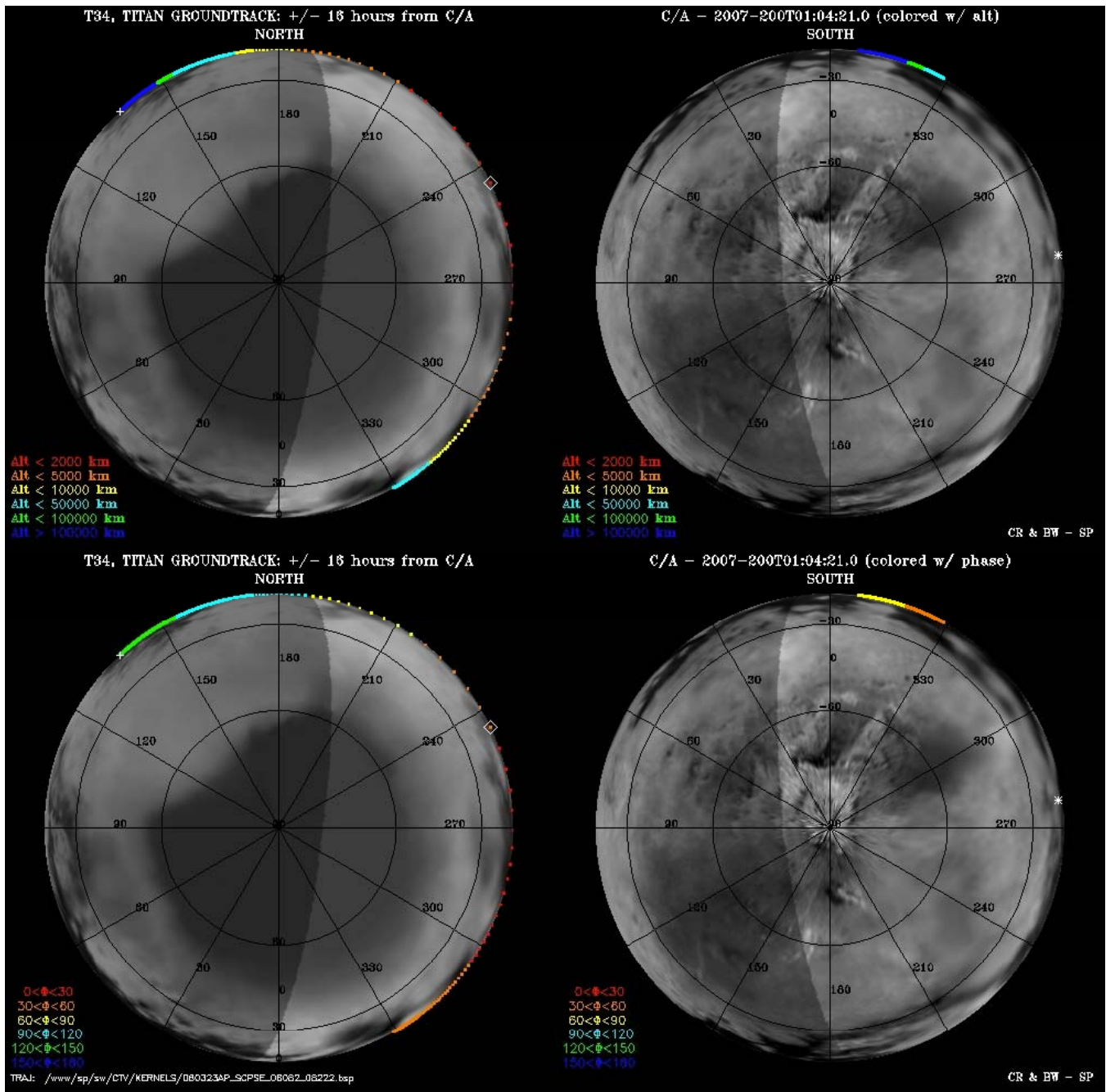
View of Titan from Cassini two hours after Titan-34 closest approach



Titan Groundtracks for T34: Global Plot



Titan Groundtracks for T34: Polar Plot



The T34 timeline is as follows:

Cassini Titan-34 Timeline - July 2007

Colors: yellow = maneuvers; blue = geometry; pink = T34-related; green = data playbacks

Orbiter UTC	Ground UTC	Pacific Time	Time wrt T34	Activity	Description
195T01:06:00	Jul 14 02:30	Fri Jul 13 06:30 PM	T34-05d00h	Start of Sequence S32	Start of Sequence which contains Titan-34
196T16:06:00	Jul 15 17:30	Sun Jul 15 09:30 AM	T34-03d09h	OTM #121 Prime	Titan-34 targeting maneuver.
197T15:51:00	Jul 16 17:15	Mon Jul 16 09:15 AM	T34-02d09h	OTM #121 Backup	
201T15:01:49	Jul 20 16:25	Fri Jul 20 08:25 AM	T34+01d14h	Descending Ring Plane Crossing	
201T20:31:00	Jul 20 21:55	Fri Jul 20 01:55 PM	T34+01d19h	Saturn Periapse	Saturn periapse, R = 5.4 Rs, lat = 0 deg, phase = 130 deg
199T00:51:00	Jul 18 02:15	Tue Jul 17 06:15 PM	T34-01d00h	Start of the TOST segment	
199T00:51:00	Jul 18 02:15	Tue Jul 17 06:15 PM	T34-01d00h	Turn cameras to Titan	
199T01:21:00	Jul 18 02:45	Tue Jul 17 06:45 PM	T34-23h50m	Deadtime	27 minutes 20 seconds long; used to accommodate changes in flyby time
199T01:48:20	Jul 18 03:12	Tue Jul 17 07:12 PM	T34-23h23m	Titan atmospheric Observations	Obtain information on the thermal structure of Titan's stratosphere.
199T09:11:20	Jul 18 10:35	Wed Jul 18 02:35 AM	T34-16h00m	ISS Nightside Imaging	Search for and monitor lightning/aurora
199T10:11:20	Jul 18 11:35	Wed Jul 18 03:35 AM	T34-15h00m	Titan atmospheric Observations	Obtain information on CO, HCN, CH ₄ . Integrate on disk at airmass 1.5--2.0.
199T12:11:20	Jul 18 13:35	Wed Jul 18 05:35 AM	T34-13h00m	Titan atmospheric Observations	Cloud map
199T16:11:20	Jul 18 17:35	Wed Jul 18 09:35 AM	T34-09h00m	Titan surface observations	Slow scans across Titan's visible hemisphere to form spectral images
199T21:20:20	Jul 18 22:44	Wed Jul 18 02:44 PM	T34-03h51m	Operating mode transition	
199T21:41:20	Jul 18 23:05	Wed Jul 18 03:05 PM	T34-03h30m	Titan surface observations	Slow scans across Titan's visible hemisphere to form spectral images
199T22:11:20	Jul 18 23:35	Wed Jul 18 03:35 PM	T34-03h00m	ISS Nightside Imaging	Search for and monitor lightning/aurora
199T23:33:20	Jul 19 00:57	Wed Jul 18 04:57 PM	T34-01h38m	Radio Science surface observations	Bistatic scattering measurements at three radio wavelengths to determine the physical properties of Titan's surface, including reflectivity, dielectric constant, and roughness.
200T01:06:20	Jul 19 02:30	Wed Jul 18 06:30 PM	T34-00h05m	Titan surface observations	
200T01:11:20	Jul 19 02:35	Wed Jul 18 06:35 PM	T34+00h00m	Titan-34 Flyby Closest Approach Time	Altitude = 1332 km (miles), speed = 6.2 km/s (13,870 mph); 34 deg phase at closest approach
200T01:40:20	Jul 19 03:04	Wed Jul 18 07:04 PM	T34+00h29m	Operating mode transition	
200T02:01:27	Jul 19 03:25	Wed Jul 18 07:25 PM	T34+00h50m	Titan surface observations	High-resolution cubes of Titan's surface.
200T03:11:20	Jul 19 04:35	Wed Jul 18 08:35 PM	T34+02h00m	ISS Imaging	NAC Regional Map
200T05:11:20	Jul 19 06:35	Wed Jul 18 10:35 PM	T34+04h00m	Titan atmospheric Observations	Obtain information on surface & tropopause temperatures, and on tropospheric CH ₄ . Scan or contiguous steps across disk.
200T06:11:20	Jul 19 07:35	Wed Jul 18 11:35 PM	T34+05h00m	ISS Imaging	NAC global map
200T09:47:20	Jul 19 11:11	Thu Jul 19 03:11 AM	T34+08h36m	ISS Imaging	WAC Photometry
200T10:11:20	Jul 19 11:35	Thu Jul 19 03:35 AM	T34+09h00m	Titan atmospheric Observations	Obtain information on CO, HCN, CH ₄ . Integrate on disk at airmass 1.5--2.0.
200T15:01:00	Jul 19 16:25	Thu Jul 19 08:25 AM	T34+13h50m	Deadtime	5 minutes long; used to accommodate changes in flyby time
200T15:06:00	Jul 19 16:30	Thu Jul 19 08:30 AM	T34+13h55m	Turn to Earth-line	
200T15:36:00	Jul 19 17:00	Thu Jul 19 09:00 AM	T34+14h25m	Playback of T34 Data	Goldstone 70M and 34M

The T34 playback timelines is as follows (following page):

Event or Observation	Observation Type (APGEN)	Observation Record Start Time (yyyy-dddThh:mm:ss)	Record Start Time - Reference Epoch (hh:mm)	Start Playback (Ground UTC)		Start Playback (Pacific Time)	
				Best Estimate	Using Average Data Rates	Best Estimate	Using Average Data Rates
MAG_048OT_SURVEY001_PRIME	MAG_1976	2007-199T00:51:00	-02T23:40	19-Jul Thu 05:05 PM	Thu 05:05 PM	19-Jul Thu 10:05 AM	Thu 10:05 AM
RPWS_048SA_OUTSURVEY003_PRIME	RPWS_30464	2007-199T00:51:00	-02T23:40	19-Jul Thu 05:05 PM	Thu 05:05 PM	19-Jul Thu 10:05 AM	Thu 10:05 AM
CIRS_048TI_MIDIRTMAP001_SI	ISS_SUPPORT_IMAGING	2007-199T01:48:20	-01T00:37	19-Jul Thu 05:08 PM	Thu 05:08 PM	19-Jul Thu 10:08 AM	Thu 10:08 AM
CIRS_048TI_MIDIRTMAP001_PRIME	CIRS_4000	2007-199T01:48:20	-01T00:37	19-Jul Thu 05:08 PM	Thu 05:08 PM	19-Jul Thu 10:08 AM	Thu 10:08 AM
VIMS_048TI_TEMPMAPO01_CIRS	VIMS_18432	2007-199T02:08:20	-01T00:57	19-Jul Thu 05:09 PM	Thu 05:10 PM	19-Jul Thu 10:09 AM	Thu 10:10 AM
ISS_048TI_MIDIRTMAP001_CIRS	ISS_Phot_1_by_1	2007-199T02:08:20	-01T00:57	19-Jul Thu 05:09 PM	Thu 05:10 PM	19-Jul Thu 10:09 AM	Thu 10:10 AM
INMS_048SA_FRB007_RIDER	INMS_1498	2007-199T07:37:08	-01T06:26	19-Jul Thu 05:34 PM	Thu 05:37 PM	19-Jul Thu 10:34 AM	Thu 10:37 AM
INMS_048CO_TINTERACT001_CAPS	INMS_1498	2007-199T08:00:06	-01T06:49	19-Jul Thu 05:36 PM	Thu 05:39 PM	19-Jul Thu 10:36 AM	Thu 10:39 AM
MIMI_048TI_T34EXTINB001_CAPS	MIMI_8000	2007-199T08:10:08	-01T06:59	19-Jul Thu 05:37 PM	Thu 05:40 PM	19-Jul Thu 10:37 AM	Thu 10:40 AM
VIMS_048TI_GLOBMAP002_ISS	VIMS_18432	2007-199T09:11:20	-01T08:00	19-Jul Thu 05:41 PM	Thu 05:45 PM	19-Jul Thu 10:41 AM	Thu 10:45 AM
ISS_048TI_NIGHTNAC001_PRIME	ISS_Phot_1_by_1	2007-199T09:11:20	-01T08:00	19-Jul Thu 05:41 PM	Thu 05:45 PM	19-Jul Thu 10:41 AM	Thu 10:45 AM
CIRS_048TI_NIGHTNAC001_ISS	CIRS_4000	2007-199T09:11:20	-01T08:00	19-Jul Thu 05:41 PM	Thu 05:45 PM	19-Jul Thu 10:41 AM	Thu 10:45 AM
CDA_048HY_2400HYORX031_RIDER	CDA_524	2007-199T09:12:41	-01T08:01	19-Jul Thu 05:42 PM	Thu 05:45 PM	19-Jul Thu 10:42 AM	Thu 10:45 AM
ISS_048TI_FIRNADCMPO01_CIRS	ISS_Phot_1_by_1	2007-199T10:11:20	-01T09:00	19-Jul Thu 06:05 PM	Thu 06:13 PM	19-Jul Thu 11:05 AM	Thu 11:13 AM
VIMS_048TI_TEMPMAPO02_CIRS	VIMS_18432	2007-199T10:11:20	-01T09:00	19-Jul Thu 06:05 PM	Thu 06:13 PM	19-Jul Thu 11:05 AM	Thu 11:13 AM
CIRS_048TI_FIRNADCMPO01_SI	ISS_SUPPORT_IMAGING	2007-199T10:11:20	-01T09:00	19-Jul Thu 06:05 PM	Thu 06:13 PM	19-Jul Thu 11:05 AM	Thu 11:13 AM
CIRS_048TI_FIRNADCMPO01_PRIME	CIRS_4000	2007-199T10:11:20	-01T09:00	19-Jul Thu 06:05 PM	Thu 06:13 PM	19-Jul Thu 11:05 AM	Thu 11:13 AM
CDA_048DR_1700DUST379_RIDER	CDA_524	2007-199T11:13:37	-01T10:02	19-Jul Thu 06:14 PM	Thu 06:23 PM	19-Jul Thu 11:14 AM	Thu 11:23 AM
VIMS_048TI_CLOUDMAP001_PRIME	VIMS_18432	2007-199T12:11:20	-01T11:00	19-Jul Thu 06:22 PM	Thu 06:31 PM	19-Jul Thu 11:22 AM	Thu 11:31 AM
ISS_048TI_CLOUDMAP001_VIMS	ISS_Phot_1_by_1	2007-199T12:11:20	-01T11:00	19-Jul Thu 06:22 PM	Thu 06:31 PM	19-Jul Thu 11:22 AM	Thu 11:31 AM
CIRS_048TI_CLOUDMAP001_VIMS	CIRS_4000	2007-199T12:11:20	-01T11:00	19-Jul Thu 06:22 PM	Thu 06:31 PM	19-Jul Thu 11:22 AM	Thu 11:31 AM
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MAG_048TI_MAGTITAN001_PRIME	MAG_1976	2007-199T21:11:20	-01T20:00	19-Jul Thu 07:26 PM	Thu 07:43 PM	19-Jul Thu 12:26 PM	Thu 12:43 PM
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UVIS_048TI_EUVFUV003_PRIME	UVIS_5032	2007-199T21:41:20	-01T20:30	19-Jul Thu 07:31 PM	Thu 07:48 PM	19-Jul Thu 12:31 PM	Thu 12:48 PM
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ISS_048TI_VHIRESNAC001_VIMS	ISS_Phot_1_by_1	2007-200T02:04:20	00T00:53	19-Jul Thu 09:08 PM	Thu 10:19 PM	19-Jul Thu 02:08 PM	Thu 03:19 PM
CIRS_048TI_VHIRESNAC001_VIMS	CIRS_4000	2007-200T02:04:20	00T00:53	19-Jul Thu 09:08 PM	Thu 10:19 PM	19-Jul Thu 02:08 PM	Thu 03:19 PM
MIMI_048TI_T34EXTOUT001_CAPS	MIMI_8000	2007-200T02:11:20	00T01:00	19-Jul Thu 09:11 PM	Thu 10:22 PM	19-Jul Thu 02:11 PM	Thu 03:22 PM
INMS_048TI_T34OUTBD001_RSS	INMS_1498	2007-200T02:11:20	00T01:00	19-Jul Thu 09:11 PM	Thu 10:22 PM	19-Jul Thu 02:11 PM	Thu 03:22 PM
CAPS_048TI_T34OUTBD001_PRIME	CAPS_16000	2007-200T02:11:20	00T01:00	19-Jul Thu 09:11 PM	Thu 10:22 PM	19-Jul Thu 02:11 PM	Thu 03:22 PM
VIMS_048TI_REGMAP002_ISS	VIMS_18432	2007-200T03:11:20	00T02:00	19-Jul Thu 10:06 PM	Thu 10:38 PM	19-Jul Thu 03:06 PM	Thu 03:38 PM
RPWS_048SA_OUTSURVEY005_PRIME	RPWS_30464	2007-200T03:11:20	00T02:00	19-Jul Thu 10:06 PM	Thu 10:38 PM	19-Jul Thu 03:06 PM	Thu 03:38 PM
ISS_048TI_REGMAP001_PRIME	ISS_Phot_1_by_1	2007-200T03:11:20	00T02:00	19-Jul Thu 10:06 PM	Thu 10:38 PM	19-Jul Thu 03:06 PM	Thu 03:38 PM
CIRS_048TI_REGMAP001_ISS	CIRS_4000	2007-200T03:11:20	00T02:00	19-Jul Thu 10:06 PM	Thu 10:38 PM	19-Jul Thu 03:06 PM	Thu 03:38 PM
CAPS_048SA_SURVEY003_RIDER	CAPS_16000	2007-200T03:11:20	00T02:00	19-Jul Thu 10:06 PM	Thu 10:38 PM	19-Jul Thu 03:06 PM	Thu 03:38 PM
VIMS_048TI_FIRNADCMPO01_CIRS	VIMS_18432	2007-200T05:11:20	00T04:00	19-Jul Thu 10:47 PM	Thu 11:27 PM	19-Jul Thu 03:47 PM	Thu 04:27 PM
MAG_048CO_TINTERACT002_PRIME	MAG_1976	2007-200T05:11:20	00T04:00	19-Jul Thu 10:47 PM	Thu 11:27 PM	19-Jul Thu 03:47 PM	Thu 04:27 PM
ISS_048TI_FIRNADCMPO02_CIRS	ISS_Phot_1_by_1	2007-200T05:11:20	00T04:00	19-Jul Thu 10:47 PM	Thu 11:27 PM	19-Jul Thu 03:47 PM	Thu 04:27 PM
CIRS_048TI_FIRNADCMPO02_SI	ISS_SUPPORT_IMAGING	2007-200T05:11:20	00T04:00	19-Jul Thu 10:47 PM	Thu 11:27 PM	19-Jul Thu 03:47 PM	Thu 04:27 PM
CIRS_048TI_FIRNADCMPO02_PRIME	CIRS_4000	2007-200T05:11:20	00T04:00	19-Jul Thu 10:47 PM	Thu 11:27 PM	19-Jul Thu 03:47 PM	Thu 04:27 PM
VIMS_048TI_GLOBMAP003_ISS	VIMS_18432	2007-200T06:11:20	00T05:00	19-Jul Thu 10:55 PM	Thu 11:36 PM	19-Jul Thu 03:55 PM	Thu 04:36 PM
ISS_048TI_GLOBMAP001_PRIME	ISS_Phot_1_by_1	2007-200T06:11:20	00T05:00	19-Jul Thu 10:55 PM	Thu 11:36 PM	19-Jul Thu 03:55 PM	Thu 04:36 PM
CIRS_048TI_GLOBMAP001_ISS	CIRS_4000	2007-200T06:11:20	00T05:00	19-Jul Thu 10:55 PM	Thu 11:36 PM	19-Jul Thu 03:55 PM	Thu 04:36 PM
ISS_048TI_PHOTOMWAC001_PRIME	ISS_Phot_1_by_1	2007-200T09:47:20	00T08:36	20-Jul Fri 12:02 AM	Fri 12:55 AM	19-Jul Thu 05:02 PM	Thu 05:55 PM
CIRS_048TI_PHOTOMWAC001_ISS	CIRS_4000	2007-200T09:47:20	00T08:36	20-Jul Fri 12:02 AM	Fri 12:55 AM	19-Jul Thu 05:02 PM	Thu 05:55 PM
VIMS_048TI_WACPHOTO01_ISS	VIMS_18432	2007-200T09:47:20	00T08:36	20-Jul Fri 12:02 AM	Fri 12:55 AM	19-Jul Thu 05:02 PM	Thu 05:55 PM
VIMS_048TI_MIRLMBINT001_CIRS	VIMS_18432	2007-200T10:11:20	00T09:00	20-Jul Fri 12:13 AM	Fri 01:07 AM	19-Jul Thu 05:13 PM	Thu 06:07 PM
UVIS_048TI_FIRNADCMPO02_CIRS	UVIS_5032	2007-200T10:11:20	00T09:00	20-Jul Fri 12:13 AM	Fri 01:07 AM	19-Jul Thu 05:13 PM	Thu 06:07 PM
ISS_048TI_FIRNADCMPO02_CIRS	ISS_Phot_1_by_1	2007-200T10:11:20	00T09:00	20-Jul Fri 12:13 AM	Fri 01:07 AM	19-Jul Thu 05:13 PM	Thu 06:07 PM
CIRS_048TI_FIRNADCMPO02_SI	ISS_SUPPORT_IMAGING	2007-200T10:11:20	00T09:00	20-Jul Fri 12:13 AM	Fri 01:07 AM	19-Jul Thu 05:13 PM	Thu 06:07 PM
CIRS_048TI_FIRNADCMPO02_PRIME	CIRS_4000	2007-200T10:11:20	00T09:00	20-Jul Fri 12:13 AM	Fri 01:07 AM	19-Jul Thu 05:13 PM	Thu 06:07 PM
CDA_048RI_1600RINGM032_RIDER	CDA_524	2007-200T10:49:59	00T09:38	20-Jul Fri 12:17 AM	Fri 01:12 AM	19-Jul Thu 05:17 PM	Thu 06:12 PM
CDA_048DR_1500DUST218_RIDER	CDA_524	2007-200T12:50:58	00T11:39	20-Jul Fri 12:31 AM	Fri 01:31 AM	19-Jul Thu 05:31 PM	Thu 06:31 PM
INMS_048CO_TINTERACT002_CAPS	INMS_1498	2007-200T13:11:20	00T12:00	20-Jul Fri 12:34 AM	Fri 01:34 AM	19-Jul Thu 05:34 PM	Thu 06:34 PM
CDA_048OT_2000BPS002_RIDER	CDA_524	2007-200T13:30:00	00T12:19	20-Jul Fri 12:36 AM	Fri 01:37 AM	19-Jul Thu 05:36 PM	Thu 06:37 PM
RSS_048TI_KADOWN002_RSS	RSS_Activity	2007-200T13:31:00	00T12:20	20-Jul Fri 12:36 AM	Fri 01:37 AM	19-Jul Thu 05:36 PM	Thu 06:37 PM
UVIS_048SW_IPHSURVEY028_RIDER	UVIS_5032	2007-200T15:36:00	00T14:25	20-Jul Fri 12:53 AM	Thu 09:14 PM	19-Jul Thu 05:53 PM	Thu 06:14 PM
RPWS_048CO_TINTERACT001_CAPS	RPWS_30464	2007-200T15:36:00	00T14:25	20-Jul Fri 12:53 AM	Thu 09:14 PM	19-Jul Thu 05:53 PM	Thu 06:14 PM
MIMI_048TI_T34EXTOUT003_CAPS	MIMI_8000	2007-200T15:36:00	00T14:25	20-Jul Fri 12:53 AM	Thu 09:14 PM	19-Jul Thu 05:53 PM	Thu 06:14 PM
CAPS_048TI_T34EXTOUT001_PRIME	CAPS_16000	2007-200T15:36:00	00T14:25	20-Jul Fri 12:53 AM	Thu 09:14 PM	19-Jul Thu 05:53 PM	Thu 06:14 PM
RPWS_048SA_INSURVEY001_PRIME	RPWS_30464	2007-200T15:50:00	00T14:39	19-Jul Thu 09:16 PM	Thu 09:16 PM	19-Jul Thu 02:16 PM	Thu 02:16 PM
CDA_048RI_1400RINGM030_RIDER	CDA_524	2007-200T16:12:27	00T15:01	19-Jul Thu 09:19 PM	Thu 09:19 PM	19-Jul Thu 02:19 PM	Thu 02:19 PM
CIRS_048IC_DSCAL07200_RIDER	CIRS_4000	2007-200T16:21:00	00T15:10	19-Jul Thu 09:20 PM	Thu 09:20 PM	19-Jul Thu 02:20 PM	Thu 02:20 PM
CDA_048DR_1300DUST219_RIDER	CDA_524	2007-200T18:13:23	00T17:02	19-Jul Thu 09:35 PM	Thu 09:37 PM	19-Jul Thu 02:35 PM	Thu 02:37 PM
CDA_048RI_1200RINGM030_RIDER	CDA_524	2007-200T21:22:48	00T20:11	20-Jul Fri 01:00 AM	Sat 10:18 PM	19-Jul Thu 06:00 PM	Sat 03:18 PM
CDA_048DR_1100DUST220_RIDER	CDA_524	2007-200T23:22:50	00T22:11	20-Jul Fri 01:18 AM	Sun 12:01 AM	19-Jul Thu 06:18 PM	Sat 05:01 PM